

# Analysis of Usability Aspects in the Disability Work Center Application (GO-DISWORK)

Dodik Arwin Dermawan<sup>1,\*</sup> Fresy Nugroho<sup>2</sup> Budiyanto<sup>3</sup>

<sup>1</sup> *Manajemen Informatika Program Vokasi, Universitas Negeri Surabaya, Surabaya, Indonesia*

<sup>2</sup> *Department of Informatics Engineering, UIN Maulana Malik Ibrahim, Malang, Indonesia*

<sup>3</sup> *Pendidikan Luar Biasa, Universitas Negeri Surabaya, Surabaya, Indonesia*

*\*Corresponding author. Email: dodikdermawan@unesa.ac.id*

## ABSTRACT

Information less than optimal in cyberspace is the leading cause of people with disabilities not getting jobs. The shortcomings of persons with disabilities are also the cause of the difficulty in obtaining information. While labor providers have opened up job opportunities for persons with disabilities, very few persons with disabilities have submitted applications due to problems in accessing information in cyberspace. This condition problem is the focus of this research. To avoid suboptimal details on job opportunities for persons with disabilities, the researcher developed the GO-DISWORK application based on several phases contained in the waterfall modeling. The choice of the waterfall is due to the ease of implementation in software development, especially for software that already has clarity in the business process flow. The system testing process uses the ISO 9126 standard, covering functionality, reliability, and usability.

**Keywords:** *Disability, Go-DISWORK, Usability, Analysis.*

## 1. INTRODUCTION

Ignoring and not involving persons with disabilities of working age in the world of work [1] is a disadvantage, especially in increasing economic growth [2]. The number of people with disabilities is more than one billion for the entire world population, and more than 70 percent are of productive age [3]. Persons with disabilities who have worked in general earn less than non-disabled workers. All of this is due to limited access to various accesses, especially education and training, resulting in difficulties obtaining decent work [4]. This condition causes people with disabilities to be vulnerable to poverty so that they exclude from life.

Finding a good job is difficult for people with disabilities because they believe it is hard to perform as efficiently as non-disabled workers or are a burden rather than a source of added value to their organization [5]. This inflexible mindset and unfavorable corporate culture pervade most industries and boundaries, substantially impacting the lives of job seekers with impairments [6]. Managerial and company decision-makers bias causes harm to job seekers, employees, and employers in both cases. The reason for this is that businesses do not hire people with disabilities. They do not adequately utilize

their employees [7]. They miss out on critical opportunities [8], which hurts their profitability and success in the long run.

This article focuses on the monetary-factors of enrollment that contribute to a company's gain [9], rather than businesses' moral or legal requirement to include people with disabilities. Numerous studies show that when the correct people with disabilities hire and give responsibilities, they exceed other employees in terms of satisfaction, productivity, loyalty, accuracy, commitment, and efficiency [10].

This research focuses on related problems that are still less than optimal work vacancy information, significantly the scope of information on work vacancies. The output of this research is a web-based application, which provides more significant opportunities for work seekers with disabilities in obtaining job information. The application is easier to use and has an industry-standard ISO 9126. Job information comes from one city and all companies in the archipelago, especially for people with disabilities. The measurement of this research is the success rate of the GO-DISWORK application developed. The measure of application is user satisfaction (usability). As a result of this research, work

seeker disabilities can demonstrate their skills by uploading a portfolio that the company can finally view online.

## 2. MATERIAL AND METHOD

### 2.1. Disability Competency Character

Competency characteristics of the disabled workforce as follow: 1. The visually impaired workforce has general competencies: adaptability, tactile, auditory, and communication [11]. 2. General competencies possessed by the workforce with hearing impairments are: communication, visual, problem solving, and visual creativity[12]. 3. Some general competencies for the workforce with intellectual disabilities are: a. communication, compliance, repetitive, and procedural work [13]. 4. Individuals with physical and motor barriers have various abilities according to the physical and motor barriers they experience[14]. 5. The following abilities are commonly found in individuals with the autistic spectrum: concentration and focus, thoroughness, visual imagination, and obeying rules[15]. 6. Individuals with multiple barriers vary significantly according to the obstacles experienced. In general, their ability to work is by their developed sensory skills and abilities [16].

To inform the best job according to the competencies possessed, it is crucial to obtain a proper and transparent assessment of job seekers' abilities, skills, and experience with physical disabilities.

### 2.2. System Usability Scale

This study starts from the respondent side and decides the testing method. Respondents from the GO-DISWORK application users have four parts: GO-DISWORK administrator, the Company as job vacancies provider, the expert/professional as competency and work vacancy matcher and disability work seeker. The testing method used is the System Usability Scale (SUS).

The scenario is that respondents from three sections carry out their respective activities first. The researcher gives a questionnaire related to the application used. The questionnaire results from the three sections will analyze and recapitulated to conclude. The research step illustrates in Fig. 1.

This questionnaire consists of ten questions and five kinds of answers. The questions are in Table 1, while the answers are in Table 2. The assessment of answers using a Likert scale 1 to 5.

The "GO-DISWORK" application, which stands for Go-Disability-Work, is a medium that provides services to bridge people with disabilities who are not yet working with companies that offer employment opportunities for people with disabilities. This application refers to the waterfall software development model. The Unified

Modeling Language (UML) design used in this study represents the system's workflow. One of them is Use Case Diagram. The analysis results show that the actors in the developed system are job providers, GO-DISWORK administrators, and job seekers with disabilities, as shown in Fig. 2.

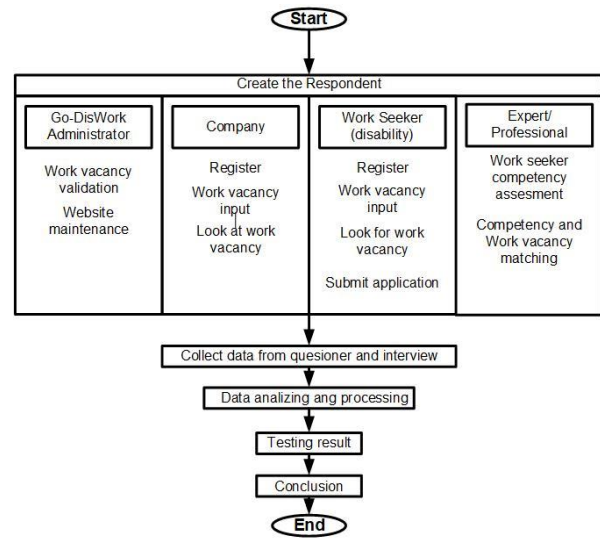


Figure 1 The Research Methodology.

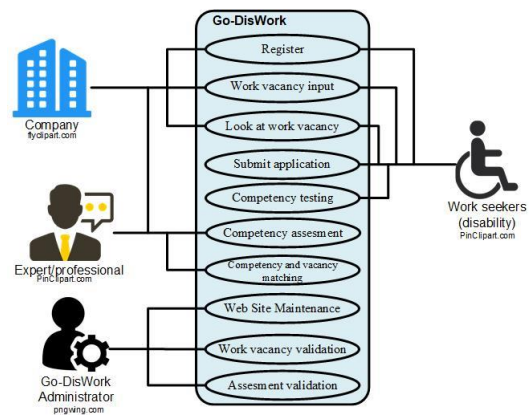


Figure 2 GO-DISWORK use case diagram.

### 2.3. Waterfall Method

This application design uses the waterfall method in designing. The waterfall method in information systems design, starting from analyzing software requirements, design, implementation, and testing. Several authors also discuss systems developed using the waterfall method, namely: development for the digital economy [17], for Agile Development [18], used for a project approach [19], from the side of the company's dilemma [20], and there is still room for developing software that keeps up with the times [21].

**Table 1** The Questionnaire.

No.	The Questionnaire
1.	I believe I will utilize this app.
2.	This system is difficult for me to utilize.
3.	This system is simple to use for me.
4.	In order to use this system, I require assistance from someone else or a technician.
5.	This system's functionalities appear to be operational.
6.	There are a number of things that I believe are inconsistent (incompatible on this system).
7.	Other individuals, I believe, will rapidly learn how to use this method.
8.	This system perplexes me.
9.	I don't believe there are any barriers to using this technology.
10.	Before I utilize this system, I need to get acquainted to it.

**Table 2** The Answer and Likert Scale.

No.	The Answer	Likert Scale
1.	Strongly contradict	1
2.	Contradict	2
3.	Distrustful	3
4.	Accept	4
5.	Strongly accept	5

### 3. RESULTS AND DISCUSSION

This application design using the waterfall method in designing the GO-DISWORK application in order to be able to manage data quickly and accurately: initial appearance, the GO-DISWORK application before the register stage as shown in Fig.3. Job seekers with disabilities can register with the system. The data entered include age, gender, and competence. Then log in to get further services. On the login menu, every user who will use the GO-DISWORK application must fill in a username and password to submit an application and portfolio.



**Figure 3** GO-DISWORK menu layout screenshot.

The evaluation is the stage of testing the product feasibility. The system testing process uses the ISO 9126 standard. The system testing process uses the ISO 9126 software standard covering functionality, reliability, and usability. The following are the test results on these aspects:

#### 3.1. Aspect functionality

Testing the functionality aspect consists of three sub-characteristics of functionality: suitability, accuracy, and security.

##### 3.1.1. Suitability

The calculation results of the suitability sub-characteristics achieve using the formula  $X = 1 - A/B$ , as shown in Table 3.

**Table 3** The Suitability Average Result.

No.	Responden	Results		
		Valid (B)	Failed(A)	X
1	IT Expert-1	24	0	1
2	IT Expert-2	24	0	1
3	IT Expert-3	24	0	1
Average		24	0	1

The result shows that the value of  $X = 1$ . The value of X measures with a scale of  $0 \leq X \leq 1$ , where the application will meet the criteria if the value of X is close to 1, then the system application has met the suitability sub-characteristic.

##### 3.1.2. Accuracy

The results of the accuracy base on the formula  $X = A/T$ , as seen in Table 4.

**Table 4** The Accuracy Average Result.

No.	Responden	R E S U L T		
		Access Frequency(T)	Failed Frequency(A)	X
1	IT Expert-1	97	8	0.08
2	IT Expert-2	97	9	0.09
3	IT Expert-3	97	6	0.06
Average		97	7.67	0.08

Based on the calculation results, the X value shows an average of 0.08. The value of X measures using a scale of  $X \leq 1$  where the application will meet the criteria if X is close to 0. It means the application has met the sub-characteristic of accuracy.

### 3.1.3. Security

The results of testing the security calculation using the formula  $X = A/B$  as seen in Table 5.

**Table 5** The Security Average Result.

No.	Respondent	R E S U L T		
		Illegal access(A)	Handling (A)	X
1	IT Expert-1	4	4	1
2	IT Expert-2	4	4	1
3	IT Expert-3	4	4	1
Average		4	4	1

Based on the calculation results, the X value shows an average of 1. The X value measure using a scale of  $0 \leq X \leq 1$  where the application will meet the criteria if the X value is close to 1, which means that the application has met the security.

### 3.2. Aspect of Reliability

The tool used in reliability testing is an open-source application based on java Apache JMeter. One of the reliability tests is stress testing through the website. In stress testing this time, the researcher tested the admin system by accessing each page of 400 requests per second (multithreading). The stress test results collected in Table 6, as Table 6.

### 3.3. Efficiency aspect

The efficiency aspect test, using two folds, Y-slow and Page-Speed Insights. The following are the test results:

**Table 6** The Aspect of reliability Score.

No.	Page	Request per second	Success (%)	Error (%)
1	Joint	400	100	0.0
2	Home	400	100	0.0
3	Administrator	400	100	0.0
4	Work seeker	400	100	0.0
5	Division	400	100	0.0
6	Assessment	400	100	0.0
7	Transmit	400	85	15.00
Average			97.86	2.14

### 3.3.1. Y-slow

Y-slow is used to measure several metrics in the efficiency category. The metrics that Y-slow can measure are HTTP requests, document size, and response time. It shows in Table 7.

**Table 7** The Efficiency Aspect Average Score.

No.	Pages	Efficiency	Grade
1	Joint	89	B
2	Home	87	B
3	Administrator	86	B
4	Work seeker	78	B
5	Division	75	B
6	Assessment	77	B
7	Transmit	75	B
Average		80.57	B

The overall efficiency test results using the Y-slow tool show an average efficiency value of 80,57 with grade B. Thus, the Y-slow test met the efficiency aspect with a good category.

### 3.3.2. Page-Speed Insight

Tests using Page-Speed Insight will show the overall score of the website. The score range is 0-100. Table 8 shows the test results using Page-Speed Insight from each page.

The test results using Page-Speed Insight obtained an average value of 81.28. Thus, through testing using Page-Speed Insight, the system is in a suitable category for the efficiency aspect.

**Table 8** The Page-Speed Insight Average Score.

No.	Halaman	Efficiency
1	Joint	79
2	Home	78
3	Administrator	90
4	Work seeker	79
5	Division	78
6	Assessment	80
7	Transmit	85
Average		81.28

### 3.4. Usability Aspect Testing

Prospective users fill out the questionnaire after demonstrating the GO-DISWORK application. The form to fill is about usability test data. The respondent consists of 3 experts/professional and 17 disability work-seeker. The frequency of the answer for each question and average score of each question obtained after all respondents fill out the System Usability Scale (SUS) questionnaire. The results of the SUS illustrate in the Table 9.

**Table 9** The Usability Aspect Average Score

Kode	Question	Frequency					Avg
		1	2	3	4	5	
P-1	This software appears to be something I'd like to utilize.	0	0	3	11	6	4.15
P-2	This system is difficult for me to understand.	9	10	1	0	0	1.6
P-3	This method is simple to operate for me.	0	3	4	10	3	3.65
P-4	In order to use this system, I require assistance from another person or a technician.	5	7	6	7	4	2.05

Kode	Question	Frequency					Avg
		1	2	3	4	5	
P-5	This system's features appear to be in good functioning order.	3	3	3	11	0	3.3
P-6	I believe there are numerous inconsistencies (incompatible on this system).	7	9	4	0	0	1.85
P-7	Other individuals, I believe, will easily grasp how to use this method.	2	0	5	11	2	3.55
P-8	This system is perplexing to me.	8	11	1	0	0	1.65
P-9	I don't see any issues with using this system.	3	1	3	9	4	3.5
P-10	Before I utilize this system, I need to become acclimated to it first.	14	6	0	0	0	1.3

Then, the overall SUS score reached 74.25, while the usability value was 72.03, and from the learnability perspective, it was 83.16, as shown in Table 10.

From the tabulation of the results of filling out the questionnaire, several biases explain the usability condition of the GO-DISWORK application. The first question inclines the middle, indicating that participants will perhaps use the app to search for places in the room. The second question concludes that the system does not have to be complicated, indicating that it should simplify to guide users to where they want to be. The third question tends to conclude that the system is relatively easy to use.

**Table 10** The System Usability Scale Score.

Kode	Question	Konversi		SUS
P-1	This software appears to be something I would like to utilize.	4.15	-1	3.15
P-2	This system is difficult for me to understand.	5-	1.6	3.4
P-3	This method is simple to operate for me.	3.65	-1	2.65
P-4	In order to use this system, I require assistance from another person or a technician.	5-	2.05	2.95
P-5	This system's features appear to be in good functioning order.	3.3	-1	2.3
P-6	I believe there are numerous inconsistencies (incompatible on this system).	5-	1.85	3.2
P-7	Other individuals, I believe, will easily grasp how to use this method.	3.55	-1	2.55
P-8	This system is perplexing to me.	5-	1.65	3.35
P-9	I do not see any issues with using this system.	3.5	-1	2.55
P-10	Before I utilize this system, I need to become acclimated to it first.	5-	1.3	3.7
Sub-scale				
<i>Overall</i> (The total scores of questions 1 to 10)		29.7	*2.5	74.25
<i>Usable</i> (The total score of 1 to 3 and 5 to 9)		23.05	*3.125	72.03
<i>Learnability</i> (The total score of 4 and 10)		6.65	*12.5	83.16

Question 4th indicating that the user still needs help to be able to achieve the desired goal. The 5th question

showing the system integrates system elements quite well. The 6th question inclines the middle, indicating that there are still inconsistencies in the system. The 7th question got a fairly average score indicating that participants may have difficulty learning the GO-DISWORK application. However, some think its use is relatively easy to understand. The 8th question tends to conclude that using the GO-DISWORK application is not practical, indicating that there are still elements that are still not easy to use. The 9th question was telling that users are confident enough to use and trust the GO-DISWORK application. The 10th question tends to conclude that there is a lot for users to learn to use the GO-DISWORK app.

The overall SUS value obtained from this usability test is only 74.25. This value is relatively high compared to the average SUS value of 62. The overall value indicates that the system's condition has met the performance standards of applications in general when tested. Based on the experience of all participants, the scores reflect the ease with which the user performs the tasks given.

When looking at each subscale contained in SUS, the scores of both subscales from GO-DISWORK are above average. It concluded that the GO-DISWORK system is easy to use. The subscale is also not far from the overall scale, considering that the overall scale value correlates with the functional subscale.

In terms of the learnable subscale, it shows that GO-DISWORK is easy to learn when used. This score is suitable for an application that general users use. From the learnable value obtained, it is necessary to improve the overall quality of the interface so that it will accelerate learning and experience in using the system.

#### 4. CONCLUSION

From the investigation, there are several essential points to be concluded regarding the usability of the GO-DISWORK application as an indoor navigation application. Usability metrics show the GO-DISWORK application is performing quite successfully and faster in helping users find work vacancies that match their competencies. The System Usability Scale (SUS) scored above the average, indicating that the system is relatively easy to use. Fixing any problems that exist in each feature will increase the ease of use of GO-DISWORK. In the future, the system integrates new features that can better assist the user experience in finding job vacancies that match their competencies. The design characteristics compiled in this study can be used as a reference to improve the usability of the GO-DISWORK application.

In this study, the following are some suggestions for the further development of this research. Enlarging the scale of the study by increasing the number of tools, the number of participants and expanding the type of

background of the participants to obtain more robust quantitative results and increase the possibility of discovering new problems. Using a paid or licensed post-study usability questionnaire, such as the Questionnaire for User Interaction Satisfaction (QUIS) or the Software Usability Measurement Inventory (SUMI), measures more subscales than SUS. Using a post-task usability questionnaire to complete each task, such as Subjective Mental Effort Question (SMEQ), Usability Magnitude Estimation (UME), Single Ease Question (SEQ), Expectation Ratings (ER), or After-Scenario Questionnaire (ASQ) to obtain a standardized evaluation for each task performed by participants.

## REFERENCES

- [1] A. Jetha, J. Bowring, A. Furrrie, F. Smith, and C. Breslin, Supporting the Transition into Employment: A Study of Canadian Young Adults Living with Disabilities, *J. Occup. Rehabil.*, vol. 29, no. 5, 2019, doi: 10.1007/s10926-018-9772-z.
- [2] V. Sundar et al., Striving to work and overcoming barriers: Employment strategies and successes of people with disabilities, *J. Vocat. Rehabil.*, vol. 48, no. 1, pp. 93–109, 2018, doi: 10.3233/JVR-170918.
- [3] M. Millott and F. T. Wulandari, Disability - inclusive development in South Sulawesi Connectivity , *People and Place*, no. 01. 2021.
- [4] S. Ramachandra, G. V Murthy, B. R. Shamanna, K. Allagh, H. Pant, and N. John, Factors Influencing Employment and Employability for Persons with Disability: Insights from a City in South India, *Indian J. Occup. Environ. Med.*, vol. 21, no. 1, p. 36, 2017, doi: 10.4103/ijoem.IJOEM\_44\_16.
- [5] S. Bonaccio, C. E. Connelly, I. R. Gellatly, A. Jetha, and K. A. Martin Ginis, The Participation of People with Disabilities in the Workplace Across the Employment Cycle: Employer Concerns and Research Evidence, *J. Bus. Psychol.*, vol. 35, no. 2, pp. 135–158, 2020, doi: 10.1007/s10869-018-9602-5.
- [6] A. Jetha, M. Gignac, S. Ibrahim, and K. A. M. Ginis, Disability and sex/gender intersections in unmet workplace support needs: Findings from a large Canadian survey of workers, *Am. J. Ind. Med.*, vol. 64, no. 10, 2020, doi: 10.1002/ajim.23203.
- [7] J. Beatty, D. Baldrige, S. Boehm, M. Kulkarni, and A. Colella, On the treatment of persons with disabilities in organizations: A review and research agenda, *Hum. Resour. Manage.*, vol. 58, no. 5, 2018, doi: 10.1002/hrm.21940.
- [8] A. Chernaya and Y. Obukhova, Psychological support for professional development of people with disabilities and special needs: An overview, *SHS Web Conf.*, vol. 70, no. 2, p. 10003, 2019, doi: 10.1051/shsconf/20197010003.
- [9] T. Aichner, The economic argument for hiring people with disabilities, *Humanit. Soc. Sci. Commun.*, vol. 8, no. 1, p. 22, 2021, doi: 10.1057/s41599-021-00707-y.
- [10] D. Brucker and V. Sundar, Job Crafting Among American Workers with Disabilities, *J. Occup. Rehabil.*, vol. 30, no. 2, 2020, doi: 10.1007/s10926-020-09889-9.
- [11] J. O'Mally and K. Antonelli, The Effect of Career Mentoring on Employment Outcomes for College Students who Are Legally Blind, *J. Vis. Impair. & Blind.*, vol. 110, no. 5, pp. 295–307, 2016, doi: 10.1177/0145482X1611000502.
- [12] P. J. Belknap, K. A. Korwin, and N. M. Long, Job coaching: A means to reduce unemployment and underemployment in the deaf community, *J. Am. Deaf. Rehabil. Assoc.*, vol. 28, no. 4, pp. 21–38, 1995.
- [13] A. Lombardi, S. Dougherty, and J. Monahan, Students With Intellectual Disabilities and Career and Technical Education Opportunities: A Systematic Literature Review, *J. Disabil. Policy Stud.*, vol. 29, 2018, doi: 10.1177/1044207318764863.
- [14] S. Hanif, H. Peters, C. McDougall, and S. Lindsay, A Systematic Review of Vocational Interventions for Youth with Physical Disabilities: How the Picture Can Change, in *Research in Social Science and Disability*, 2017, pp. 181–202.
- [15] N. Murray, M. Hatfield, M. Falkmer, and T. Falkmer, Evaluation of career planning tools for use with individuals with autism spectrum disorder: A systematic review, *Res. Autism Spectr. Disord.*, vol. 23, pp. 188–202, 2016, doi: https://doi.org/10.1016/j.rasd.2015.12.007.
- [16] J. K. Duc, A. Herbert, and H. Heussler, Paediatric palliative care and intellectual disability—A unique context, *J. Appl. Res. Intellect. Disabil.*, vol. 30, 2017, doi: 10.1111/jar.12389.
- [17] K. Saeedi and A. Visvizi, Software development methodologies, heis, and the digital economy, *Educ. Sci.*, vol. 11, no. 2, pp. 1–22, 2021, doi: 10.3390/educsci11020073.
- [18] U. S. Senarath, Waterfall Methodology, Prototyping and Agile Development. 2021, doi: 10.13140/RG.2.2.17918.72001.

- [19] T. Thesing, C. Feldmann, and M. Burchardt, Agile versus Waterfall Project Management: Decision Model for Selecting the Appropriate Approach to a Project, *Procedia Comput. Sci.*, vol. 181, pp. 746–756, 2021, doi: 10.1016/j.procs.2021.01.227.
- [20] K. Chandran and M. Das Aundhe, Agile or waterfall development: The Clementon Company dilemma, *J. Inf. Technol. Teach. Cases*, vol. 0, no. 0, p. 2043886919870544, 2021, doi: 10.1177/2043886919870544.
- [21] A. Rasheed et al., Requirement Engineering Challenges in Agile Software Development, *Math. Probl. Eng.*, vol. 2021, p. 6696695, 2021, doi: 10.1155/2021/6696695.